

KAMPALA INTERNATIONAL UNIVERSITY

**An Optimized Secure Online Voting System for Interim
Independent Electoral Commission of Kenya,
Case Study: Changamwe Constituency**

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**A PROJECT REPORT IS SUBMITTED TO THE SCHOOL OF COMPUTER STUDIES IN
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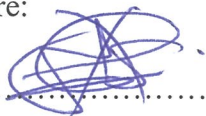
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DECLARATION

We do hereby declare that this project report is our original work and has never been presented to any academic institution for any award.

The literature and citations from other people's work have been duly referenced and acknowledged in the text and reference.

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APPROVAL

This is to certify that this study by **ALI MWINYIFAKI JUMA** and **DILANO OMONDI KEVIN** has been carried out under the title “AN OPTIMIZED SECURE ONLINE VOTING SYSTEM FOR INTERIM INDEPENDENT ELECTROL COMMISSION OF KENYA” case study of “CHANGAMWE CONSTITUENCY” has been under my supervision and proposal report is now ready for submission to the university council with my approval

Signed: 

Mr. ABUBAKAR SWALEH AHMED

Supervisor

Date. 25/05/2011

DEDICATION

I, Ali Mwinyifaki Juma, Dedicate this project to my Lovely Parents **Mr. Mwinyifaki Juma** **Mzee** and **Mrs. Kibibi Kisua Mohammed** for their love and support they showed towards me during my academic journey. MAY THE ALMIGHTY ALLAH REWARD THEM ABUNDANTLY. I dedicate this research in fully gratitude for what you have done for me both materially and spiritually and for believing in me despite all odds. With all my heart, this dedication is my humble recognition of your importance to me and my future life.

I, Dilano Omondi Kevin, dedicate this project to my mum **Grace M Achieng'** and my brother **Horace O. Fred** for their love and support they showed towards me during my academic journey. I dedicate this research in fully gratitude for what you have done for me both materially and spiritually and for believing in me despite all odds. With all my heart, this dedication is my humble recognition of your importance to me and my future life.

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Secondly, I dedicate this piece of work to my beloved parents for their encouragement, love, moral support and caring they showed me during my academic journey. MAY THE ALMIGHTY ALLAH REWARD THEM ABUNDANTLY.

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ABBREVIATIONS

D.M.L-Data manipulation language
I.I.E.C -Interim Independent Electoral Commission of Kenya
O.V.S-Online Voting System,
O.S-Online system
E.V.T-Electronic Voting Technology
A.T.M-Automated Teller Machine
D.S.A-Denial of Service Attack
N.S.F-National Science Foundation
J.B.C-Judges Booth Controller
S.Q.L-Structured Query Language
G.U.I-Graphical User Interface
P.I.N-Personal Identity Number
D.R.E-Direct Recording Electronic

CHAPTER 1

1.0 Introduction

The online voting system made it possible for registered voters to securely vote over the internet. The aims of the system are to provide a convenient and reliable way to elect their representatives and to give an early and positive experience of democracy through participation. This enhanced increase in participation, lower the cost of running election and improve the accuracy of results. The voting system will be majorly considered in changamwe constituency in its initial implementation.

1.1 Background of the study

The **Interim Independent Electoral Commission of Kenya (IIECK)** was set up on May 7, 2009. The commission was set up to replace the previously disbanded Electoral Commission of Kenya that was widely blamed for the election violence after the Kenyan general election, 2007. The commissioners were sworn in on May 11, 2009. (IIEC, 2007)

The Interim Independent Electoral Commission of Kenya (IIEC) was established by the Government of Kenya as part of the wider reforms to be undertaken under Agenda 4 of the Kenya National Accord and Reconciliation Act. The IIEC's mandate includes: reform of the electoral process, establishment of an efficient and effective secretariat, fresh registration of voters and creation of a new voters' register.

This mandate underlies the Government's commitment to the realization of Vision 2030 priorities particularly the political pillar which seeks to transform the country's political governance system through cultivating a transparent electoral and political process, in order to ensure that the Commission delivers on its mandate. (IIECK, 2007)

Elections allow the populace to choose their representatives and express their preferences for how they will be governed. Many of the surveys that have been conducted for different countries have shown that the current populace places a high value on non-academic experience when at university or college. (M. Herschberg, 1997)

Online voting system ensures that, spoilt ballot papers are completely eliminated as voters must vote correctly to register their vote. This system will present a more efficient and

effective voting. All computations will be carried out by the computer through a database which will speed up the operation. (C. A. Gaston, 2005)

Changamwe Constituency is an electoral constituency in Changamwe, Kenya. It is one of four constituencies in Mombasa District. The constituency has eight wards electing councilors for the Mombasa municipal council. The wards are Mikindani, Changamwe, Kipevu, Miritini, Portreiz, Tudor estate, Jomvu kuu, Tudour four.

1.2 Problem Statements

Elections in changamwe constituency are being conducted using a manual system. Voters are registered manually in a file system causing long queues during election period. There were also cases of double registration of voters, missing name of voters and incorrect names entered caused by traditional file systems that are slow and tedious.

The old systems also faces delays in vote counting caused by manual counting of votes, and as a result of that the turnout is low. Since most population is scattered in different parts of changamwe, it becomes so hard for them to leave there work and go to polling station. They were also cases of rigging and corruption which arise during the election process, since there were some candidates or officials who manipulate and influence the outcome and finally results are announced that are erroneous and contradictory.

1.3 Purpose of the study

The purpose of the study is to develop an Optimized Online Voting System for Interim Independent electoral Commission of Kenya.

1.4 Objectives of the study

- i. To investigate how the election process is carried out in Kenya by I.I.E.C body, and establish the distinct features that are, or can be applied in case of software compliance.
- ii. To find out the effect of manual voting system used by I.I.E.C in conducting elections in Changamwe, and to establish the steps taken by I.I.E.C to counter this problems.
- iii. To find out the difficulties changamwe citizens experience in the voting process.
- iv. To design an Online voting System for Kenyans from scratch to solve the problems faced by Changamwe citizens.
- v. To implement a secure Online Voting System that will be used to conduct election process in Changamwe constituency.

1.5 Research Questions

- i. What are the challenges of a manual voting system?
- ii. Can the current manual system be changed to a computerized system?
- iii. What are the security issues in the voting system?
- iv. What categories of voting do you encounter in the current voting system?

1.6 Scope of the study

An Optimized Secure Online Voting System for Interim Independent Electoral Commission of Kenya will work in the country's Electoral body to conduct election in Changamwe constituency. Voters are registered according to their details that are in their identification cards or passports and their polling stations.

The online voting system made it possible for registered voters to securely vote over the internet. The online voting system is part of e-democracy for people in countries. The aims of the system were to provide a convenient and reliable way to elect their representatives and to give an early and positive experience of democracy through participation. This enhanced increase in participation, lower the cost of running election and improve the accuracy of results. The voting system will be majorly considered in changamwe constituency for the starting of its implementation.

1.7 Justification and significance of the study

When implemented the computerized system is expected to;

- I. Improve the voting process since it is expected to be faster, eliminating queues which cause delays that are experienced by the voters.
- II. It will reduce the manpower cost (candidate's agents and election officials) this will make it cheap in terms of the amount of money used to pay them.
- III. Data will be processed accurately and be sufficiently robust to withstand rigging or corruption attempts to abuse it (the system).this will ensure that there is data integrity.
- IV. It will help to achieve flexibility, since one can vote and access information (results) any time.
- V. It will give a room for citizens of east Africa to develop a better voting system for their countries.

CHAPTER 2

1.0 Literature review

Electronic voting systems for electorates have been in use since the 1960s when punched card systems debuted. The newer optical scan voting systems allow a computer to count a voter's mark on a ballot. DRE voting machines which collect and tabulate votes in a single machine, are used by all voters in all elections in Brazil and India, and also on a large scale in the Venezuela and the United States. They have been used on a large scale in the Netherlands but have been decommissioned after public concerns. Internet voting systems have gained popularity and have been used for government elections and referendums in the United Kingdom, Estonia and Switzerland as well as municipal elections in Canada and party primary elections in the United States and France. There are also hybrid systems that include an electronic ballot marking device (usually a touch screen system similar to a DRE) or other assistive technology to print a voter-verifiable paper ballot, then use a separate machine for electronic tabulation. (Lorrie Faith Cranor, 2001)

Keonwoo Kim and Dowon Hong (2007) state that in an e-voting by touch screen, a voter directly selects Candidates or the vote content appeared on a screen as the finger. This voting with fast counting time has also a problem that voters go to the polling place. In the meantime, an e-voting using internet has no inconvenience that voters should visit the voting booth. However, this voting is executed just in the environment with internet accessible computer candidates.

To make the union, and the rest taken seriously, they need to be supported by strong electoral results. So what proportions do turn out in the last elections? So it is time to look at a reliable online voting to increase turn out in this modern world. A well organized and promoted elections using online voting can really boost these votes. It can reduce the hostilities of the election, cutting down on the need to find clerks at polling stations and counting duties.(C. A. Gaston, 2005)

Each time e-voting has allowed better voter choice and wider voter participation by accommodating multiple candidates in single seat races and assuring that a "spoiler effect" will not result in undemocratic outcomes. E-voting allows all voters to vote for their favorite candidate without fear of helping elect their least favorite candidate, and it ensures that the winner enjoys true support from a majority of the voters. Not only are many colleges

switching to e-voting, already more than 50% of the nation's top thirty universities have adopted e-voting and/or choice voting for student government elections on campus (based on rankings by U.S. News and World Report, 2007).

Rebecca Mercuri (May 2001) states in a report on the impact of technology that the dramatic impact of the internet has led to discussion of e-democracy and online voting. Some early enthusiasts declared that the internet could replace representative democracy, enabling everyone to vote on everything and anything at the push of a button. Such visions oversimplified the democratic process.

From the Electronic Voting Technology Workshop (EVT); They wrote a report on the use of online voting on (EVT, 2007, pg 67). They reported that there are three main types of electronic voting. Of these, online voting is the focus of most current attention. If such voting is to become a reality, it must address each of the steps required by the locality of the place. For instance, the registration process would need to include distribution of appropriate identification numbers, etc. Passwords and smart cards can be used to increase the reliability and security of voter authentication; however, it is difficult to prevent voters from giving away or selling their votes when authentication is carried out without human intervention. Coercion and large scale fraud may also be more of a concern than at present. Online voting would also need to address obtaining, marking, delivering, and counting ballots via computer.

Some electoral systems already use computers in these steps - for example, a punch card ballot system uses a computer for ballot counting, while an automatic teller machine (ATM)-style electronic voting system uses a computer for all four steps. An intermediate option could allow voters to download their ballot paper from the internet, mark it with a pen, and submit it by postal mail, and have it counted by hand. Some electronic voting systems result in a paper output which can be recounted, but systems in which votes are never recorded on paper may not lend themselves to any sort of recount. Vendors offer machines that record every button a voter presses on an ATM-style machine. These keystrokes can be examined after an election to simulate a recount. (C. A. Gaston, 2005)

However, concerns have been raised that the machines might be manipulated so as not to record certain keystrokes. With remote internet voting, recounts in the traditional sense are not feasible. Some vendors of internet voting systems guarantee that their system cannot lose or miscount votes. But critics have suggested that only by using open-source programs (where the computer code is in the public domain so that observers can check how the program

works) can there be sufficient confidence in the integrity of the process.(X. Y. Cerone and P. Y. Zhang, 2006).

The National Science Foundation (NSF) Internet Voting Report March 2001, addresses the feasibility of different forms of Internet voting from both the technical and social science perspectives, and defines a research agenda to pursue if Internet voting is to be viable in the future. It groups Internet voting systems into three general categories as follows:

Poll-site Internet voting: It offers the promise of greater convenience and efficiency in that voters could cast their ballots from any poll site, and the tallying process would be both fast and certain. More importantly, since election officials would control both the voting platform and the physical environment, managing the security risks of such systems is feasible. (National Science Foundation Internet Policy Institute, 2001)

Kiosk voting: Voting machines would be located away from traditional polling places, in such convenient locations as malls, libraries, or schools. The voting platforms would still be under the control of election officials, and the physical environment could be modified as needed and monitored (e.g., by election officials, volunteers, or even cameras) to address security and privacy concerns, and prevent coercion or other forms of intervention.(Lorrie Faith Cranor, 2000)

Remote Internet voting: It seeks to maximize the convenience and access of the voters by enabling them to cast ballots from virtually any location that is Internet accessible. While this concept is attractive and offers significant benefits, it also poses substantial security risks and other concerns relative to civic culture. Current and near-term technologies are inadequate to address these risks (Elliot David M, 1999).

Interest in fair elections systems for citizen's elections around the country has been gaining momentum. More and more country are following the recommendations of Robert's Rules of Order and adopting online voting (also called "e-voting") for single winner elections like parliamentary, civics and presidential. (C. A. Gaston. 2005) additionally, some schools have added the choice voting method of full representation for their legislative elections;

2.1 Security issues of online voting systems

E-voting system is often confronted by security issues while the electronic voting system is running. The origin of the security issues happened was due to not only outsider (such as voters and attackers) but also insider (such as system developers and administrators), even just because the inheritance of some objects in the source code are unsuitable. These errors caused the voting system crashed. (T. Kohno et al, 2004)

In “Electronic Voting”, Rivest addresses some issues like the “secure platform problem” and the possibility of giving a receipt to the voter. He also provides some personal opinions on a host of issues including the striking dissimilarity between e-commerce and e-voting, the dangers of adversaries performing automated, wide-scale attacks while voting from home, the need for extreme simplicity of voting equipment, the importance of audit-trails, support for disabled voters, security problems of absentee ballots, etc.

“**Security Criteria for Electronic Voting**” considers some basic criteria for confidentiality, integrity, availability, reliability, and assurance for computer systems involved in electronic voting. After an assessment of the reliability of those criteria, it concludes that, operationally, many of the criteria are inherently unsatisfiable with any meaningful assurance.

Rubin (2007) identifies the new risks brought about by introducing the state-of-the-art technology into the election process, which may not be worth taking. The major security risks identified include those at the voting platform – including malicious payload (attack programs, remote administration and monitoring toolkits, etc.) and delivery mechanism (worms, viruses and bugs, active content downloaded automatically, etc.) – and the communications infrastructure – including (distributed) denial of service attack, DNS server attack, etc. He also identifies security issues in social engineering and in using specialized devices.

Elections allow the populace to choose their representatives and express their preferences for how they will be governed. Naturally, the integrity of the election process is fundamental to the integrity of democracy itself. The election system must be sufficiently robust to withstand a variety of fraudulent behaviors and must be sufficiently transparent and comprehensible that voters and candidates can accept the results of an election. Unsurprisingly, history is littered with examples of elections being manipulated in order to influence their outcome (IEEE Computer Society Press, May 2004)

2.2 Effectiveness of citizen online voting system

Georgetown University; Georgetown University's Student Association voted in April 2006 to implement online voting system for their presidential elections. In fall 2006 students approved online voting system for student Senate elections by a margin of ten-to-one. They held a remarkably successful election that October over the Internet. They have used online voting system for all student Senate elections since being adopted, except in 2009. Voted to restore it for the 2010 elections (M. Herschberg, 1997).

University of Iowa; In March 2008, the President and the Vice President of the UL (University of Iowa) Student Government have been elected thanks to online voting system for the first time. They ran under party tickets and platforms. Senators are also elected using this method- for humanities, fine arts, nursing, natural sciences, social sciences, business, education, and engineering (areas of study) and at-large senators get voted in this way as well. Since then, voter turnout has increased significantly. After the 2008 elections on June 20 the Daily Iowan reports: "*A record-setting 32.53 percent of eligible students voted in the UISG electronic runoff ballot, casting 6,357 votes*".

University of Wisconsin; The United Council of University of Wisconsin Students has adopted online voting to elect the president of its General Assembly, a body of about 150 representatives from schools across Wisconsin. The United Council is the nation's oldest, largest and strongest statewide student association, representing more than 145,000 students at 24 UW System Campuses (Ragowsky, A.; Ahituv, N.; Neumann, S. 1996).

Luther College; Luther College in Iowa adopted online voting in the spring of 2007. At first, the Student Government used e-voting only for electing the President, Vice-President and Secretary, but this will be expanded to include class representatives to the Student Senate. (LC, 2007)

2.3 Evaluation of Voting Equipment

In the recent years, voting equipments which were widely adopted may be divided into five types: (M. Keller et al, 2005)

Paper-based voting: The voter gets a blank ballot and use a pen or a marker to indicate he want to vote for which candidate. Hand-counted ballots is a time and labor consuming process, but it is easy to manufacture paper ballots and the ballots can be retained for verifying, this type is still the most common way to vote.

Lever voting machine: Lever machine is peculiar equipment, and each lever is assigned for a corresponding candidate. The voter pulls the lever to poll for his favorite candidate. This kind of voting machine can count up the ballots automatically. Because its interface is not user-friendly enough, giving some training to voters is necessary.

Direct recording electronic voting machine: This type, which is abbreviated to DRE, integrates with keyboard; touch screen, or buttons for the voter press to poll. Some of them lay in voting records and counting the votes is very quickly. But the other DRE without keep voting records are doubted about its accuracy.

Punch card: The voter uses metallic hole-punch to punch a hole on the blank ballot. It can count votes automatically, but if the voter's perforation is incomplete, the result is probably determined wrongfully.

Optical voting machine: After each voter fills a circle correspond to their favorite candidate on the blank ballot, this machine selects the darkest mark on each ballot for the vote then computes the total result. This kind of machine counts up ballots rapidly. However, if the voter fills over the circle, it will lead to the error result of optical-scan.(M. Keller et al, 2005)

2.4 Comparison of E-voting System

Besides many vendors to develop and sell commercial electronic election machines, there are various open source E-voting systems. We cite some examples as follows:

AccuVote-TS: AccuVote-TS's vendor is Diebold Election Systems. This system includes touch screen, card reader, keyboard, headphone, and paper tape printer. The voter selects his favorite candidate on touch screen, and the vote will be printed on the paper tape. Its design balances the policy, electoral procedure and technology. But all the electoral information

(including identity authentication, audit, or counting of votes) are stored in Microsoft Access database without setting password so there are high risks of attack. (C. A. Gaston, 2005)

iVotronic: The vendor of iVotronic is Election Systems and Software (ES&S). iVotronic provides multi-language, and uses flash memory to save voting records. Electoral workers use PEB, a device which is similar to disk) to start polling machine up. When the election is finished, the workers use PEB to access voting records in the polling machine, then delivers PEB to electoral center or transmits data from network. Because the PEB's password is only three characters, the risk of password breaking exists. This system have made mistake in the past elections, such as the number of voters is not corresponding between master server and backup server, the candidate selected on the ballot is not the voter's selection, and so forth. (C. A. Gaston, 2005)

eSlate 3000: Hart InterCivic invented eSlate 3000. The voter gets a personal identity number (PIN) as four digits from electoral workers, then goes to the booth to input the PIN into polling machine to login. He can rotate selector wheel to select the candidate whom he want to poll for. Each terminal connects to the server which is named JBC (Judges Booth Controller). Counting of votes will send to JBC from every terminal by network, then save it in MBB (Mobile Ballot Box). This system doesn't encrypt voting data, so there are some risks of data security. Furthermore, the electoral functions are not protected with password, anyone, even the voter, can finish the election. (Chaum, 1981)

SAVIOC: SAVIOC voting system operates from disk, so hard disk is not necessary and the discarded computer is enough. This system is not connected to any networks and most of keys on the keyboard are disabled, attackers can't find the way to invade. SAVIOC's advantages are its simple disposition and low cost, but on the other hand, there are short of GUI and ease of use on SAVIOC. (Lorrie Faith Cranor, 2001)

CHAPTER 3

RESEARCH METHODOLOGY

3.0 Research Methodology

This section discusses the methodology that was used in gathering the data. Here the researcher aimed at identifying the objectives to be carried out and the methods and tools to be used to present and analyze data to get proper and maximum information related to the subject under study, the methodology involved identifying the stakeholders interviewed and questioned about the current system, why they need a new system and their views concerning the expectations they anticipate from the new system. This also involves identifying the various data collected by the diverse data collection techniques highlighted in this chapter and the methods of data manipulation and reporting.

3.1 Target population

The target population for gathering the system requirements constituted three major players, they included:

IIEC Officials: These are the officials of the electoral commission of Kenya, they are the ones who are responsible in conducting the election process in Kenya, they identified the problems/difficulties which they experience when conducting election.

Voters: The voters of the proposed system are the Kenya Citizen especially from Changanwe, who will interact with the system by registering with system and casting their votes. Voters are the users of the system and they constitute all citizens in Changanwe constituency who are eligible to qualify as voters.

3.2 sample population

3.2.1 Cluster sampling

Sampling is the act, process, or technique of selecting a suitable sample, or a representative part of a population for the purpose of determining parameters or characteristics of the whole population. A cluster sample was obtained by selecting clusters from the population on the basis of simple random sampling. The sample comprises a census of each random cluster selected. For example, a cluster may be something like a village or a school, a state. For our

case study we took random clusters from every ward so as to get a clue of what the citizens of Changamwe constituent want

3.3 Data collection

The data collection methods used for data collection in the research were primary and secondary data collection methods.

3.3.0 Primary data collection

Observation

The researcher spent time observing how the election process was carried out in Changamwe constituency by being an agent during the last year's referendum election (2010). The information gathered during observation included how voters were authenticated against the registry, requirements needed to cast a vote and the process of casting a ballot.

Questionnaires

The researcher used self administered questionnaires by asking the respondents to complete the questionnaires themselves. The questionnaire structure was based on open and closed ended questions to maximize the efficiency and flexibility of the questionnaire. The subjects the researcher included in the questionnaires were the users of the system who are the voters. The respondents filled the questionnaires as directed. The open ended questions required the respondents' personal outlook (views). The closed ended questions required direct answers, to obtain specific pieces of information. The questionnaire was well answered and the detail of the respondents was treated with great confidentiality having assured the subjects to keep and treat secret of their submitted response.

Interviews

The researcher used open interviews to the respondent whereby there was no predefined agenda as discussion was carried in an open-ended way on the current system and the laybacks that occur in the Election operations. The researcher asked questions that relate to the specific problem statement and objectives. The respondents' response was very helpful and non-biased on implementing a system based on their preferences, interests, attitudes and goals.

3.3.1 Secondary data collection

The Internet

Through the internet, the researcher was able to carry out comparative research related to Electronic Voting Systems and was able to deduce important data on their operations as far as equipments, security issues and management of data is concerned that helped in analyzing the requirements for the system. The data collected played a big part in shaping the system under development.

Books, Magazines and Journals

Literature in books, magazines and journals authored by experts especially in this field of e-voting and its applications, access to scholar's books also proved useful as their content carried rich data for my research.

3.4 Data Analysis and presentation

This section showed the various data analysis collected using the various data collection techniques summarized using bar charts and tables. These diagrams helped to make a perfect decision of the requirements needed and whether the project is still feasible at this point.

The goal of doing data Analysis and presentation was to describe the functional and non-functional requirements of the system to be developed. It presented an overview of the project's specifications, its functional requirements, its scope, goals and capabilities and a description of the targeted users.

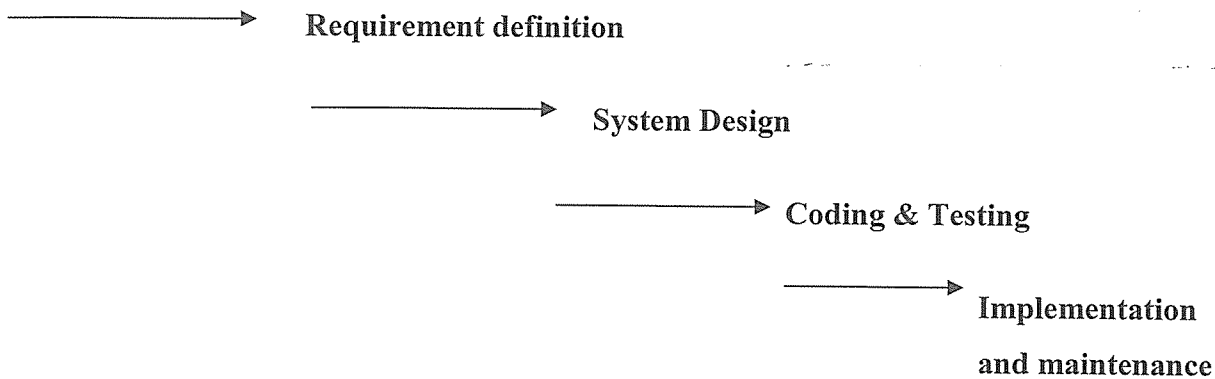
3.5 System Development Life Cycle

Here the researcher used the water fall model in developing the system

4.6The Water Fall Model

The waterfall model is a sequential software development process, in which progress is seen as flowing steadily downwards (like a waterfall) through the phases of Conception, Initiation, Analysis, Design (validation), Construction, Testing and maintenance. To follow the waterfall model, one proceeds from one phase to the next in a purely sequential manner.

Initial investigation



The system to be developed will follow a prototyping design methodology which is based on the idea of the water fall model that deals with developing an initial implementation, exposing to users comment and refining through many versions until an adequate system has been developed. The development starts with part of the system which is understood, and then the system evolves by adding new features as they are proposed by the users and finally producing a system which meets the immediate needs of users.

In the ststem desigh the researcher used different methods of desighing the system which included logical diagrams, physical diagrams, state diagrams and many others.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS, AND SYSTEM DESIGN

4.0 Data Analysis and presentation

This section shows the various data analysis collected using the various data collection techniques summarized using bar charts and tables. These diagrams helped to make a perfect decision of the requirements needed and whether the project was still feasible at this point.

The goal of doing data Analysis and presentation was to describe the functional and non-functional requirements of the system to be developed. It would present an overview of the project's specifications, its functional requirements, its scope, goals and capabilities and a description of the targeted users.

4.1 RESPONDENTS

The table below shows the number of individuals targeted for collecting data and the final number of individuals involved in the actual data collection.

sample population used in the questionnaire and interview process	Number of individuals targeted	Number of individuals involved
IIEC official	1	1
Agents	5	2
Citizens(voters)	10	10
TOTAL	16	13

Sample population interviewed

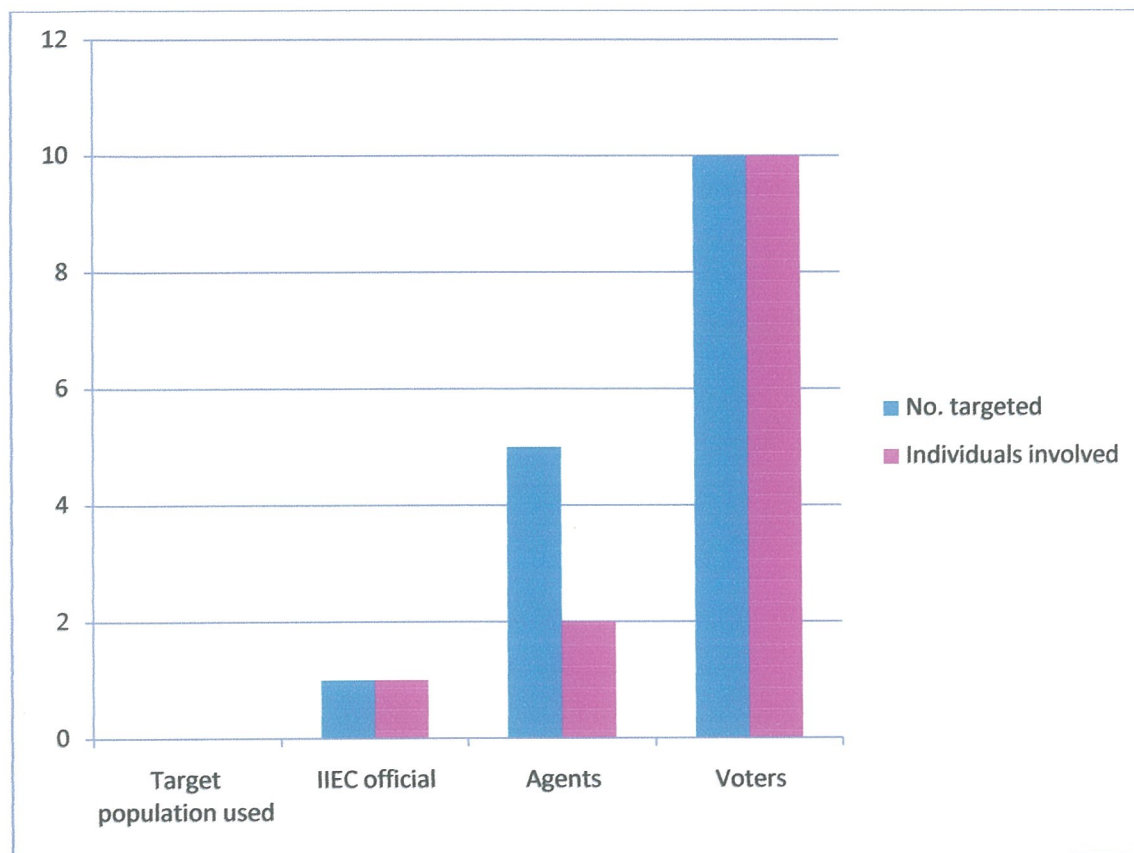


Figure 4.1 Sample population analyses

The above table shows the number of individual against different categories of individuals that were targeted for administering questionnaires and interview.

Qs No	Question	Analysis	Remarks
1	Are you comfortable in browsing the internet?	Yes:9 No:1	90% of sample citizens were comfortable in browsing the internet.
2	Do you have a full access to the internet?	Yes:4 Partial:6 No:0	40% had full(24 hours) access to the internet. 60% had limited access to the internet. None had no access to the internet.
3	Are the internet services reliable?	Yes:7 No:3	70% of those with access to the internet felt that the services were reliable. 30% of those with access to the internet felt that the services are not reliable.

4	Are you comfortable with the current voting system?	Yes:1 No:9	10% of sample citizens are comfortable with the current voting system. 90% of them dont feel comfortable with it.
	If No, what problems do you experience?		From the 90% of sample citizens who dont feel comfortable with the current voting had the following problems: • It was slow(takes a lot of time to vote) • Rigging of votes • Results takes long to be processed
5	Do you recommend a computerized (online) system of voting to be introduced?	Yes:9 No:1	90% of the sample citizens recomended an online voting system. 10% did not agree with an online voting.
	If Yes, what benefits would be brought (personally) if a new online voting system was to being introduced?		From the 90% who recomended an online voting system gave the following reasons: • Faster to vote and giving results • Cheaper in the long run • It will be more reliable ,efficient and effective in terms of resources • It would be convenient and voting wont belimited to stations • Reduce rigging
6	Kindly suggest the features you think the system should have		90% of those who recomended the system,sugested the following features; • Voter registration • Show candidates manifesto • Casting the votes • Login form • Database • Levels of access(restriction measures) • Vote tallying • View results • Campaign updates

Figure 4.2 Sample Voters Questionnaire Analysis

QUESTION	REMARKS	COMMENT
Did you experience any problem with the current voting system?	• Some of his supporters could not turn up turn up that day since they dont have classes. • It take long for the IIEC to tally the results which creates alot of tension • Ballot papers are delayed • There are long queues • Ballot papers had errors	From this it shows how the current voting system is not efficient and it consumes alot of time.Since candidates depend alot on their voters hence leads to unfair wins.
In your opinion,what is the best way to handle such problems?	• Its better to have a system that candidates can cofirm their names before the voting day. • Since citizens are busy their should be a quick system of voting	This is a clear indication that a computerised system is being needed since to them is seems to be part of the solution on existing problems.
Would you like the next election be online?	Yes	Thats a positive response to the new system
What benefits would it bring to you as a candidate?	• It will make it easy to conduct a free and fare election. • It will increase the voting turn-out. • Will be cheap since a candidate will not need an agent,whom he/she is surposed to pay. • Voters will be able to cast their votes away from the institution • It will reduce the number of spoilt votes • Reduce the tension	Its a clear indication that the the online voting system will make a positive impact to the candidates.

	in which candidates get during election	
Kindly suggest the features you think the system should have	• Tallying the votes. • Processing votes. • Voters registration • Updates of the campaign	These features will guide in creating an effective system.

Table 3.2 Agents Interview Analysis

QUESTION	REMARKS	COMMENT
What problems are facing the IIEC in conducting elections, and what are the steps taken to counter this problem?	<u>problems</u> • Delay in voting since most facilities have to be transported from the headquarter. • Low voting turn-out • Large queues in the voting hall • Errors with some of the ballot papers • Rigging cases <u>Solutions</u> • Increase the number of clerks • Try to encourage citizens to vote by putting a lot of posters and flyers	This indicates how troubles the IIEC gets while conducting the elections, in which some of the problems are partially addressed.
How does the current voting system operate.	One uses his citizen ID/voting ID, then the clerks verify it by checking the respective list, then one is given a ballot paper to cast his/her vote. At the end of the day voters are counted by opening each ballot box one by one. Then results are announced.	This indicates how the process is long and tiresome and there are higher chances that errors may occur.
Would you like an online voting system to be introduced?	Yes, it would be a brilliant idea in improving the current voting system.	This shows that an online system will create more good than the current voting system.
What kind of features would you suggest to have?	• Voter authentication. • Vote tallying • Voters registration	These features will guide in creating an effective system.

Figure 4.3Sample Electoral Commission(IEEC) Interview Analysis

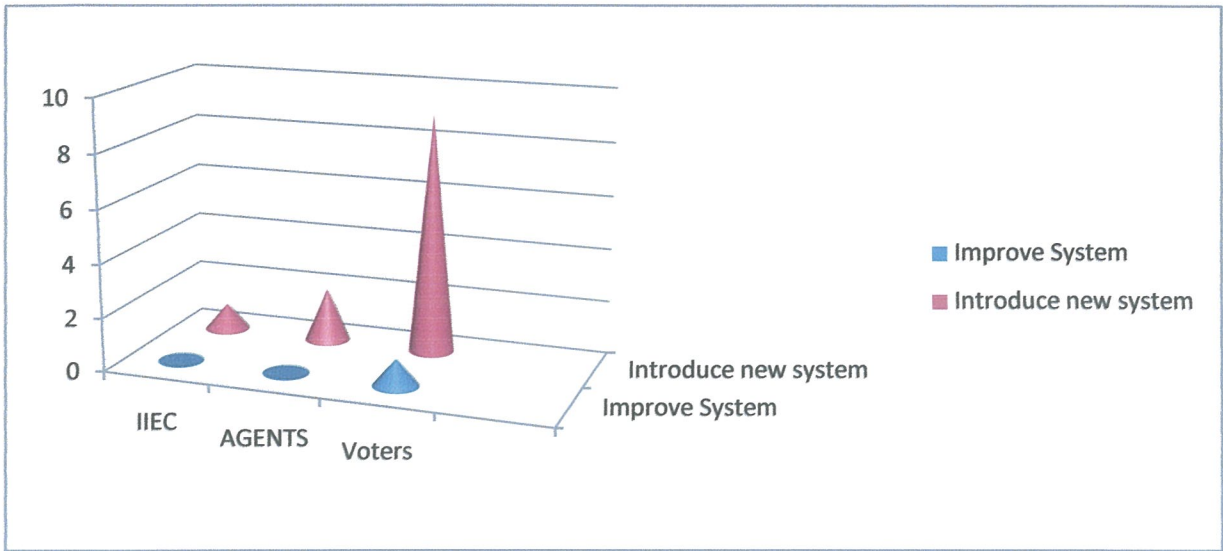


Figure above shows System Acceptance

The table above depicts the number of individuals who want the current system to be improved and those who want a new system.

4.2 Functional requirements

Voter Registration

This system shall allow voters(citizens) to be able to register themselves,hence enabling them to login into the system when casting there votes.the system should be able to give a confirmatory message once a user has been successfully registered.During registration it will enable users to provide there own passwords that will be easy for them to use while they login they are abt to cast their votes.

Casting Vote

After a voter(citizens) have been succesfully registered then he/she can be able to cast his/her vote.So for one to be able to do that he/she must first login using the password and some details which he/she provided for registration,this helps in authentication(access control) based on what the user knows(password).After a successful login the user is able to cast his/her vote by selecting his/her prefered candidate.Casting votes shall only be allowed only during the election period and one is allowed to vote only once.

Processing Vote

The system should be able to process the votes by accepting, storing and sending a confirmation message to the voters after successfully casting their votes. The system shall record the selection of individual vote choices for each contest and indicate that a selection has been made or canceled by notifying the voter when the selection is completed. Before the vote has been casted, the voter is allowed to review his choices and, if he desires, he delete or change his choices before the vote is finally submitted. And finally the system shall notify the voter after the vote has been stored successfully that the vote has been casted.

View Results

The system should be able to give a notification if one has voted successfully. The system should be able to tally the results (automatically) and enable the users to view the results.

View Manifestos

For those voters who don't know who to vote for, shall have a chance of viewing the manifesto of the candidates before they vote. This will guide voters who know nothing about the candidates make a wise decision.

Functional Requirements	Description
Voter Registration	Voters register with the system by entering their details
Cast Vote	After successful registration, voters will log into the system by giving out their details so that they can proceed to cast their votes.
View results	This requirement includes processing of votes, tallying and displaying the results to the voters.
View Manifestos	This requirement allows the voter to view the manifestos of each and every candidate.

Functional Requirements Summary

4.3 Non Functional requirements

Usability

The voting system should have a user-friendly interface layouts that are interactivity,satisfying the system user and facilitating appropriate responses.The interface should enable users to move from one interface to the other freely and also it shall display interface differently based on the user's role.the interface should be easy to learn hence users would not have difficulties as they interact with it.

Availability

The system should be readily available for use when a user logs in(during elections) and at any point that he/she is as long as it is internet connected.There should be transparency in accessing the system.

Security

The system should limit the users who have access to the system and the rights that different users can have according to their functions to prevent any unauthorised person from accessing the system.It should also ensure that security mechanism are implemented such as authentication of registered voters, privacy of the vote and general transparency of the system.The out come of the votes must correspond to the amount of votes casted.Only the registered voters shall be allowed to cast their votes,so if one is not registered he/she cannot be able to vote.

Scalability

The system should be able to be upgraded and expanded as the requirements tend to increase after some time due to the increasing change in technology.It should also permit trouble shooting and the correction of errors.

4.4 Use Case Diagram

The Use Case Diagram below represents the two main actors of a Online Voting system and how they interact with system to complete some specific tasks.

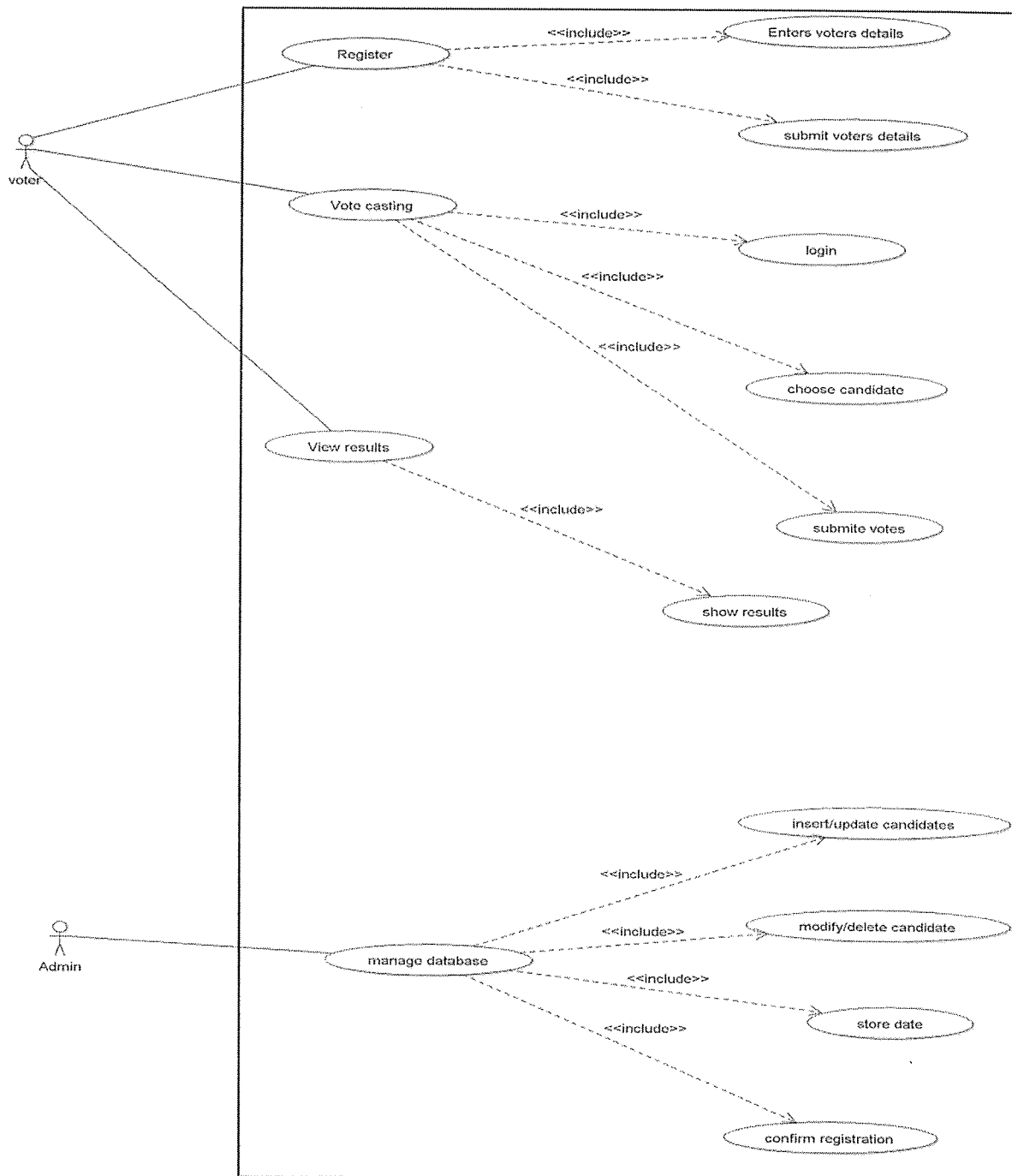


Figure 4.3 use case diagram

4.5 Requirements of the system

Requirements of the system consisted of both the hardware and software requirements that were needed to develop and implement an Online Voting System, they include:

4.5.0 Hardware Requirements

The hardware required during the development process of the system which will enable the process of development to be completed on time includes:

Standard PC,

4.5.1 Software Requirements

The software requirements are:-

Microsoft Windows Operating system (Windows XP and Vista): the system to be developed is mainly going to be running on the windows platform, this is because of the ease of use.

WAMP this will be used to develop the online application since it contains Php enabled program and apache which enables a smooth running of the php codes.

Microsoft office suite: this will enable me to word process the documents that will be used in the development such as the Gantt charts and also produce the documentation using Microsoft office. Since the database will be MY SQL then the office suite will be used to develop the database.

4.6 System Design

These are set of activities and associated results which produce a software product. These activities will be carried out by use of various system development tools that will be discussed later in this chapter.

4.7 Logical design

The logical design of the system involves using a choice of design tools to come up with various diagrams representing a range of functionalities of the system including the class relationships, sequence of activities as well as the start and end of the system.

4.7.0 Class Diagram

Class diagram gives an overview of the system by showing its classes and the relationship among them. This diagram depicts the different classess in Online voting system and how they interact with each other to perform their functions.

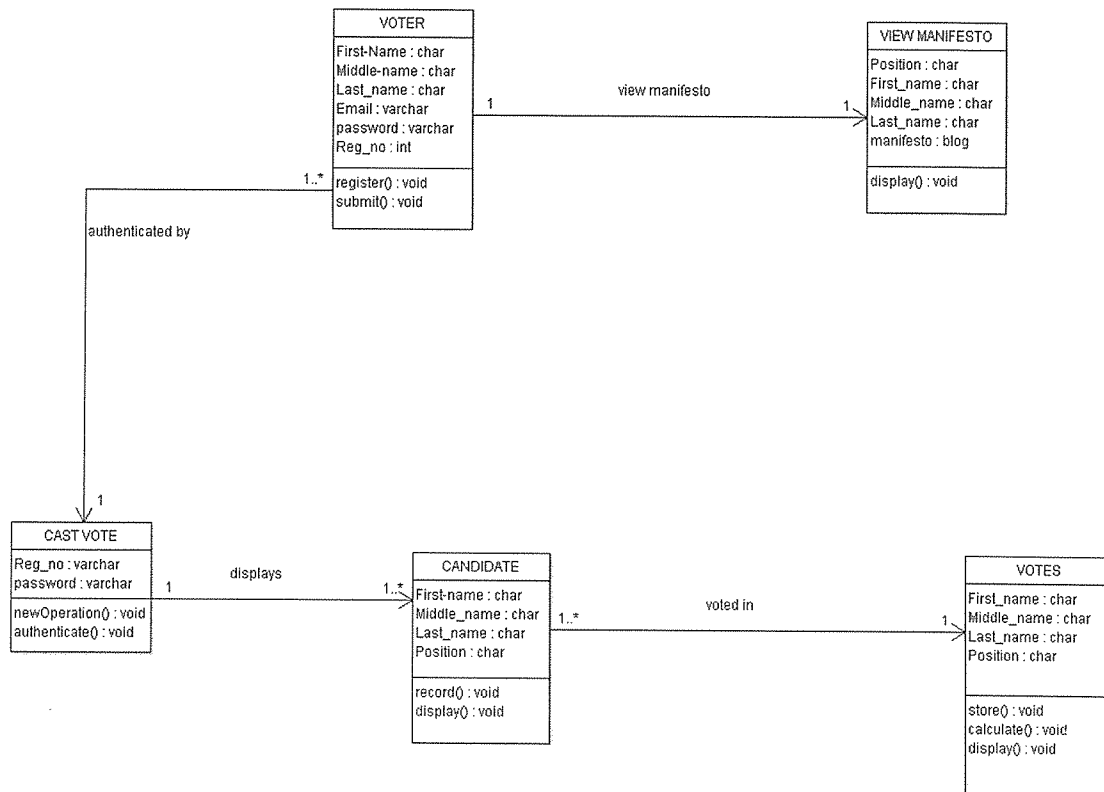


Figure 4.0: class diagram for Online voting system

4.7.1 Sequence Diagram

The sequence diagram shows how voters interact with the system, beginning with the registration to viewing of results. The interaction depicts the detailed operations that are carried out, messages that are sent and the time in which the sequence diagram is organized. The time progress as you go down the sequence diagram, and the objects' involved in the operation are listed from the left to right according to when they take part in the message sequence.

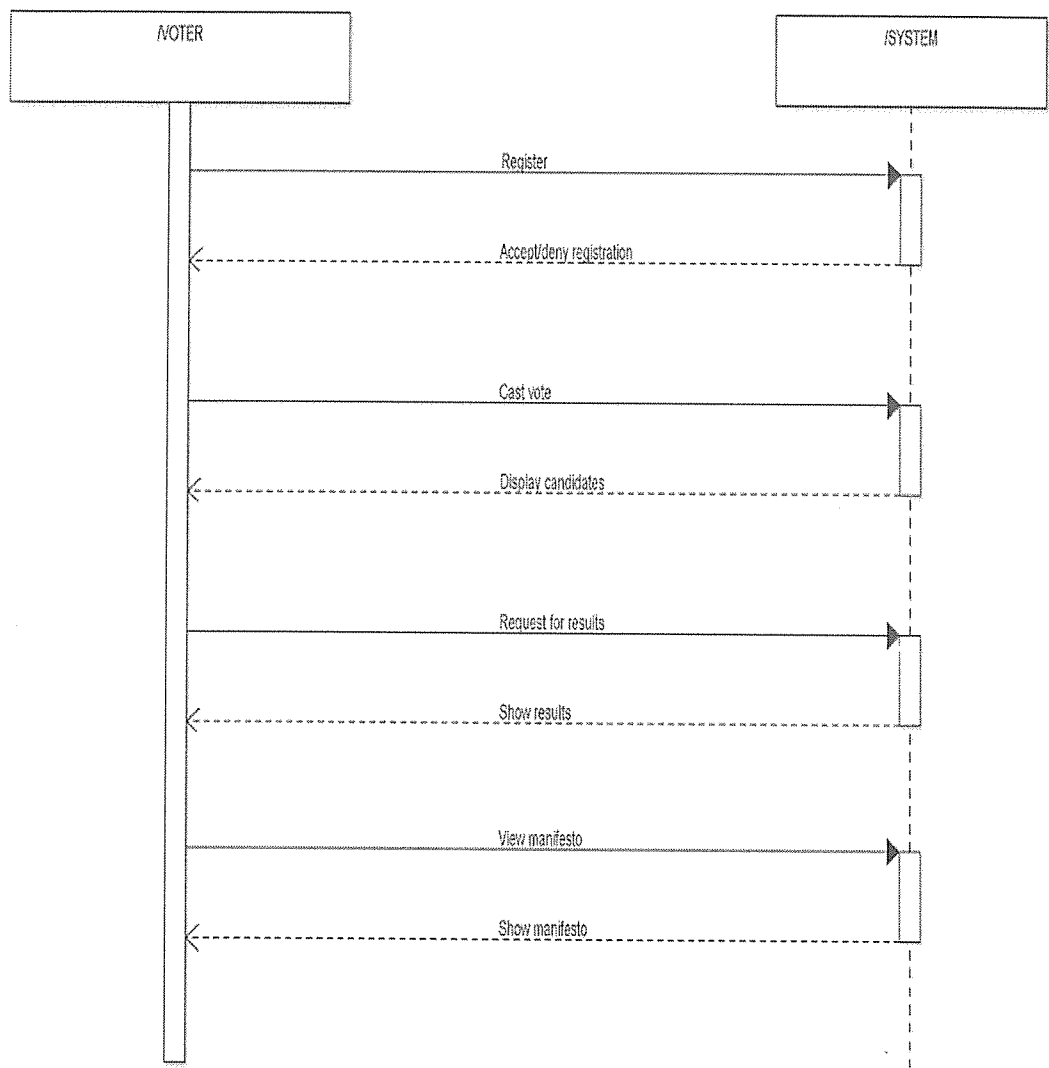


Figure 4.7.1: sequence diagram for Online voting system

4.7.2 Collaboration Diagram

The collaboration diagram focus on objects (class) roles and the messages that take place between the objects, objects roles are the vertices and messages are the connecting links. The messages are numbered according to how they are initialized in a sequence.

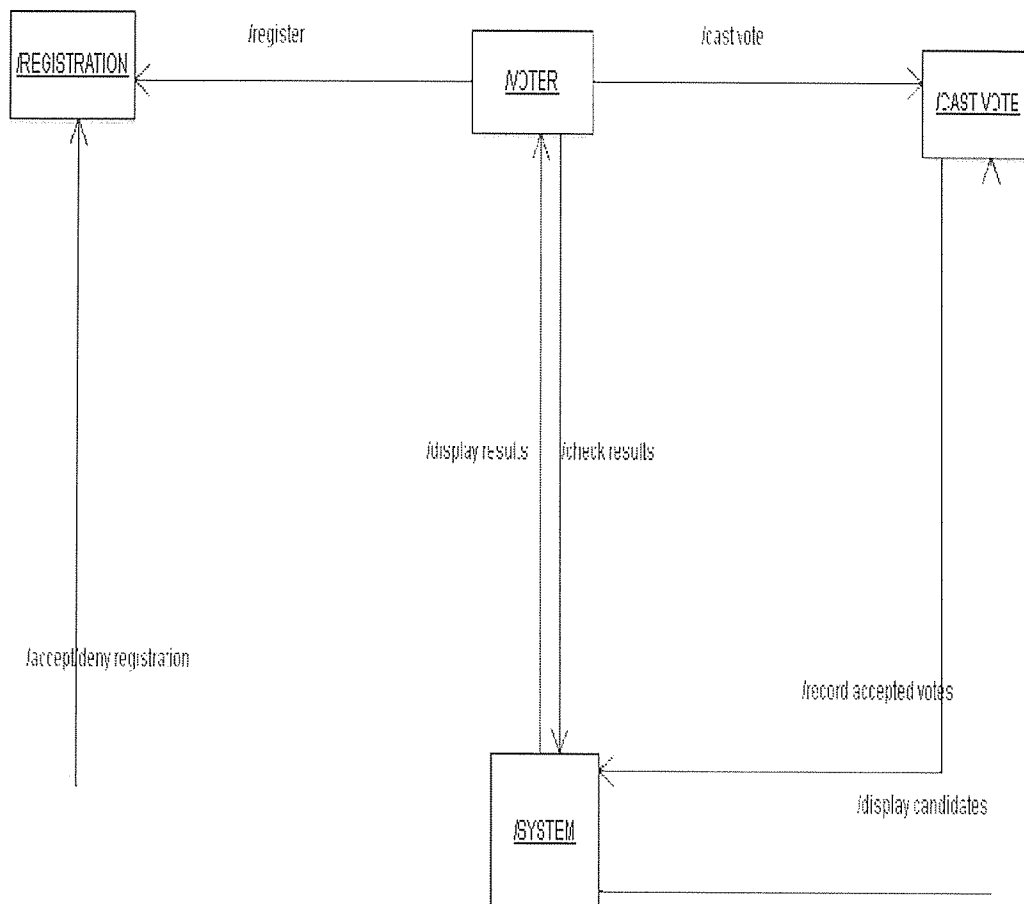


Figure 4.7.2: collaboration diagram for Online voting system

4.7.3 State Diagram

State diagram shows the beginning and the end of the system, the diagram depicts the related fields to describe the behavior of systems which is composed of a finite number of states, in this scenario the system begins with registration activity and ends with the results activity.

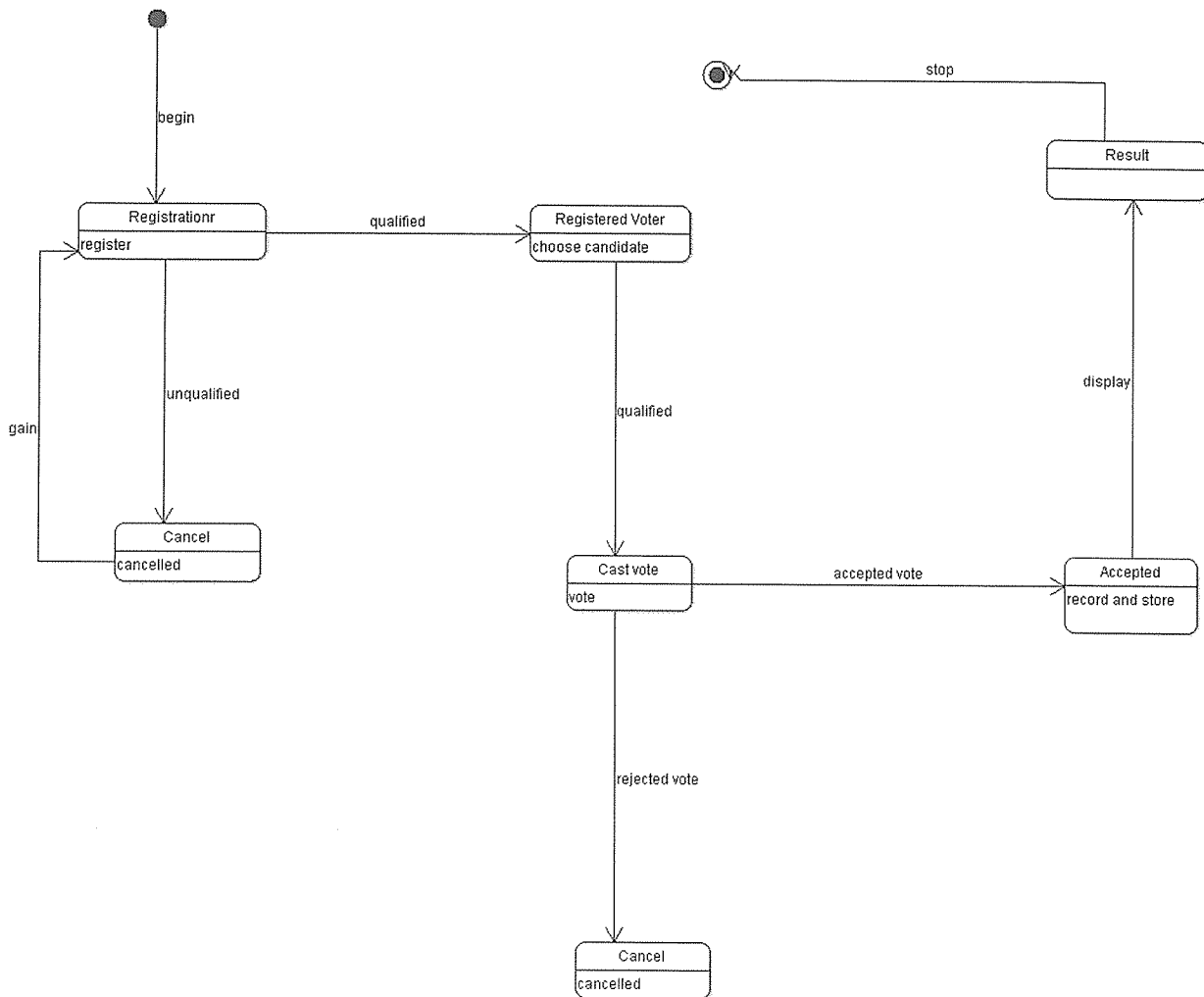


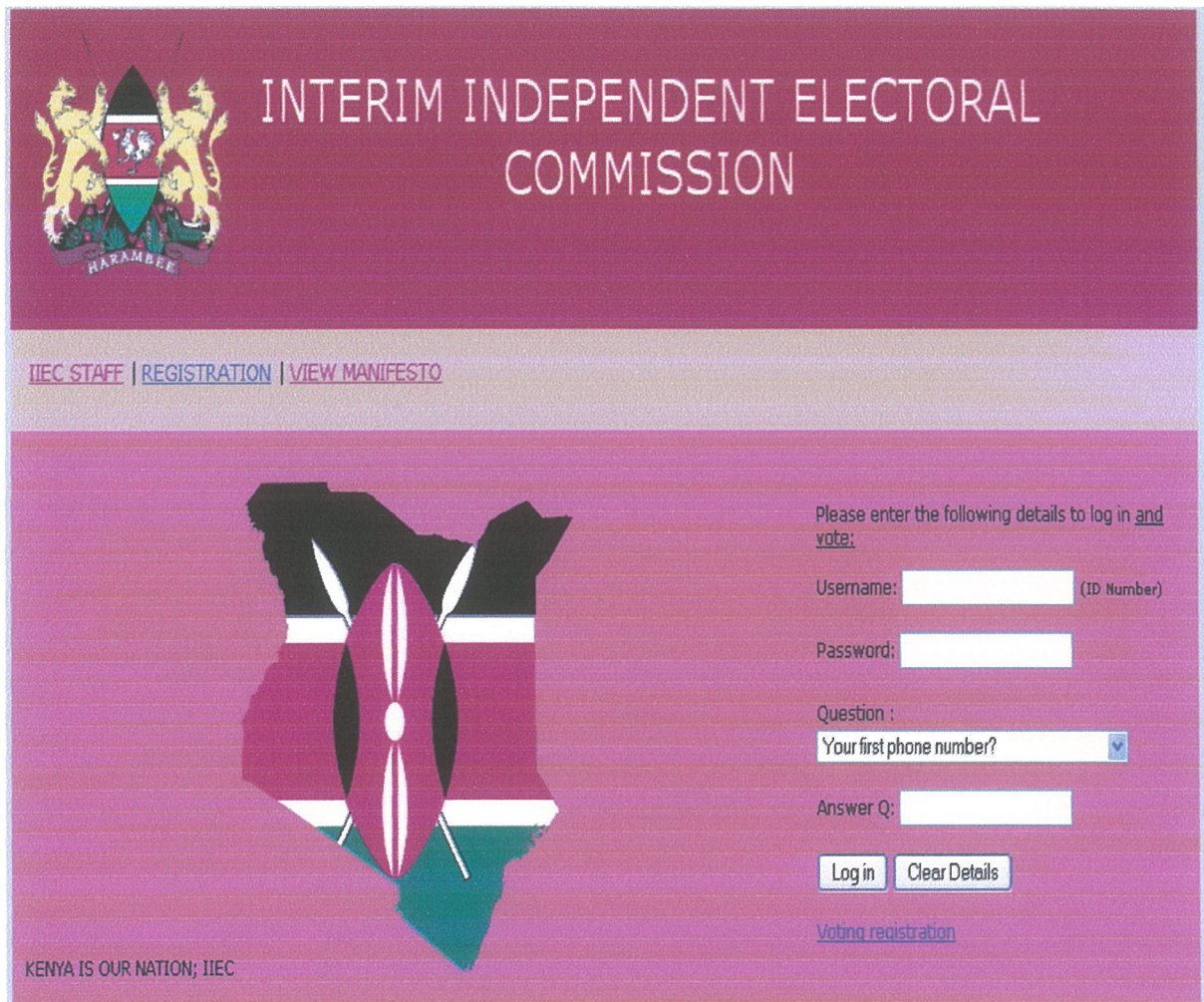
Figure 4.7.3: state diagram for Online voting system

4.8 User Interface Design

The user interface consists of the interface that the voters will use to interact with the system. In our case there are several interfaces that voters interact with to register and cast their votes.

4.8.0 Welcome screen

This screen enables users to easily choose the task they desire to take. Either to register if a user is not registered, to vote, view results and also view manifesto.



INTERIM INDEPENDENT ELECTORAL COMMISSION

[IIEC STAFF](#) | [REGISTRATION](#) | [VIEW MANIFESTO](#)

Please enter the following details to log in and vote:

Username: (ID Number)

Password:

Question :
 ▼

Answer Q:

[Voting registration](#)

KENYA IS OUR NATION; IIEC

Figure 4.8.0 Welcome Screen

4.8.1 Registration form

Unregistered voters can be registered so as to enable them to cast there votes.

HOME | [IIEC STAFF](#) | [VIEW MANIFESTO](#)

Please enter the following details to register for the forth coming elections:

Username: (Your ID number e.g. 123456789)

First name:

Last name:

Province:

Constituency:

Ward:

Password:

Question :

Answer Q:

☐ Male ☐ Female

KINDLY BE PEACEFUL DURING THIS ELECTION PERIOD;
THE NATION IS MORE IMPORTANT THAN AN INDIVIDUAL.
THANK YOU, IIEC.

Figure 4.8.1

Registration form screen

4.8.2 Log in

This enables the registered voters to get into the system and vote.

Please enter the following details to log in and vote:

Username: (ID Number)

Password:

Question :
Your first phone number?

Answer Q:

[Voting registration](#)

INTRODUCTION

IIEC was founded in the year 2010 as a result of electoral irregularities experienced in Kenya over the past few years more the 2007 general elections which led to loss of lives and many were displaced from their homes.

Welcome to Interim Independent Electoral Commission(IIEC)

Establishment
IIEC was created by the Constitution of Kenya (Amendment) Act 2008 whose mandate is to

- Reform the electoral process and the management of elections in order to institutionalize free and fair elections<
- Establish an efficient and effective secretariat
- Promote free and fair elections
- Conduct fresh registration of voters and the creation of a new voters' register
- Conducting of the referendum for the new constitution

Figure 4.8.2 Log in screen

4.8.3 Cast Vote

After a succesful logging in,a voter can now cast his/her vote by choosing there desired candidate.

Enter your ID Number:

PRESIDENTIAL CANDIDATES:

☐ Ralla Oginga Odinga ☐ Martha Karua ☐ Uhuru Kenyatta

PARLIAMENTARY CANDIDATES(MP):

☐ Kajembe Ramadhan ☐ Ali Mwinifaki ☐ Dr. Kibwana J

CIVIC CANDIDATES:

Figure 4.8.3 Cast vote screen

4.8.4 View Results

If a voter desires to view the result then, this will make it easy for him. Since one can be able to know which candidate is leading and by how many votes.

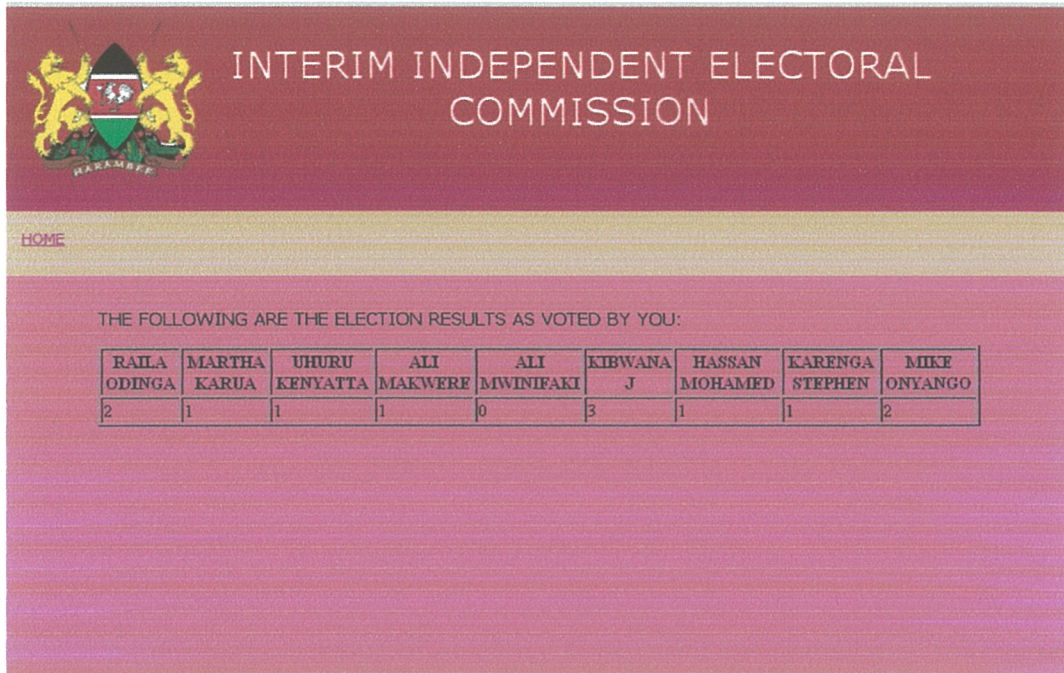


Figure 4.8.4 View Results screen

4.8.5 Manifestos

This enables voters to view the manifestoes of the candidates if he/she feels like he wants to make a sound judgement

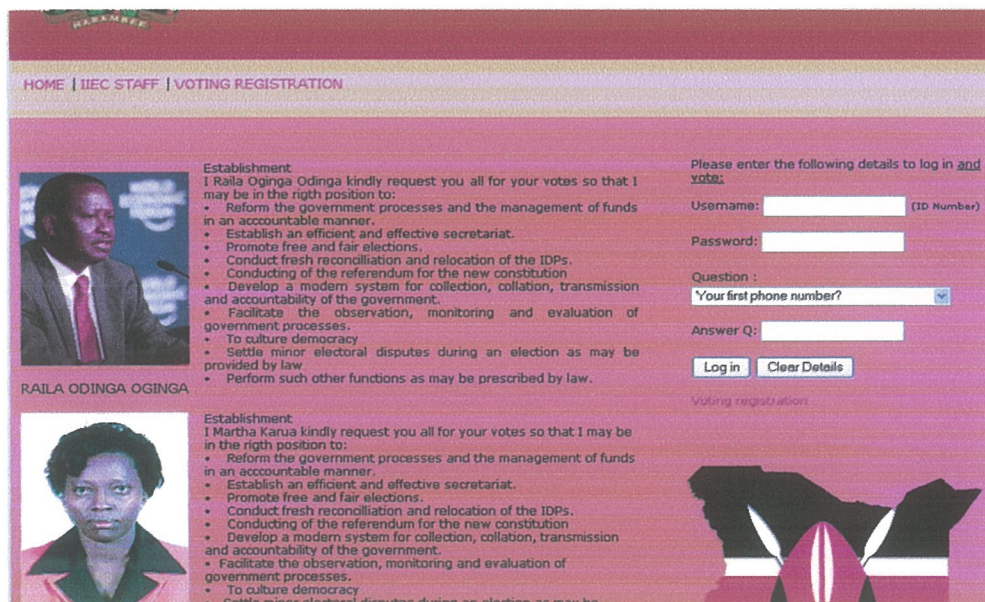


Figure 4.8.4 Manifesto screen

4.9 Database Design

Database design encompasses the conceptual, logical and the physical design of the database, each model is depicted by help of a diagram and a brief explanation is provided for each.

4.9.0 Conceptual Model

A conceptual entity-relationship model shows how the business world sees information. It only describes the entities, attributes and the relationship that exists between the entities, in our case the conceptual model explains the entities and relationship that exists in an Online Voting system, the entities include; voter, candidates, manifesto, cast vote and results in the database as shown below:

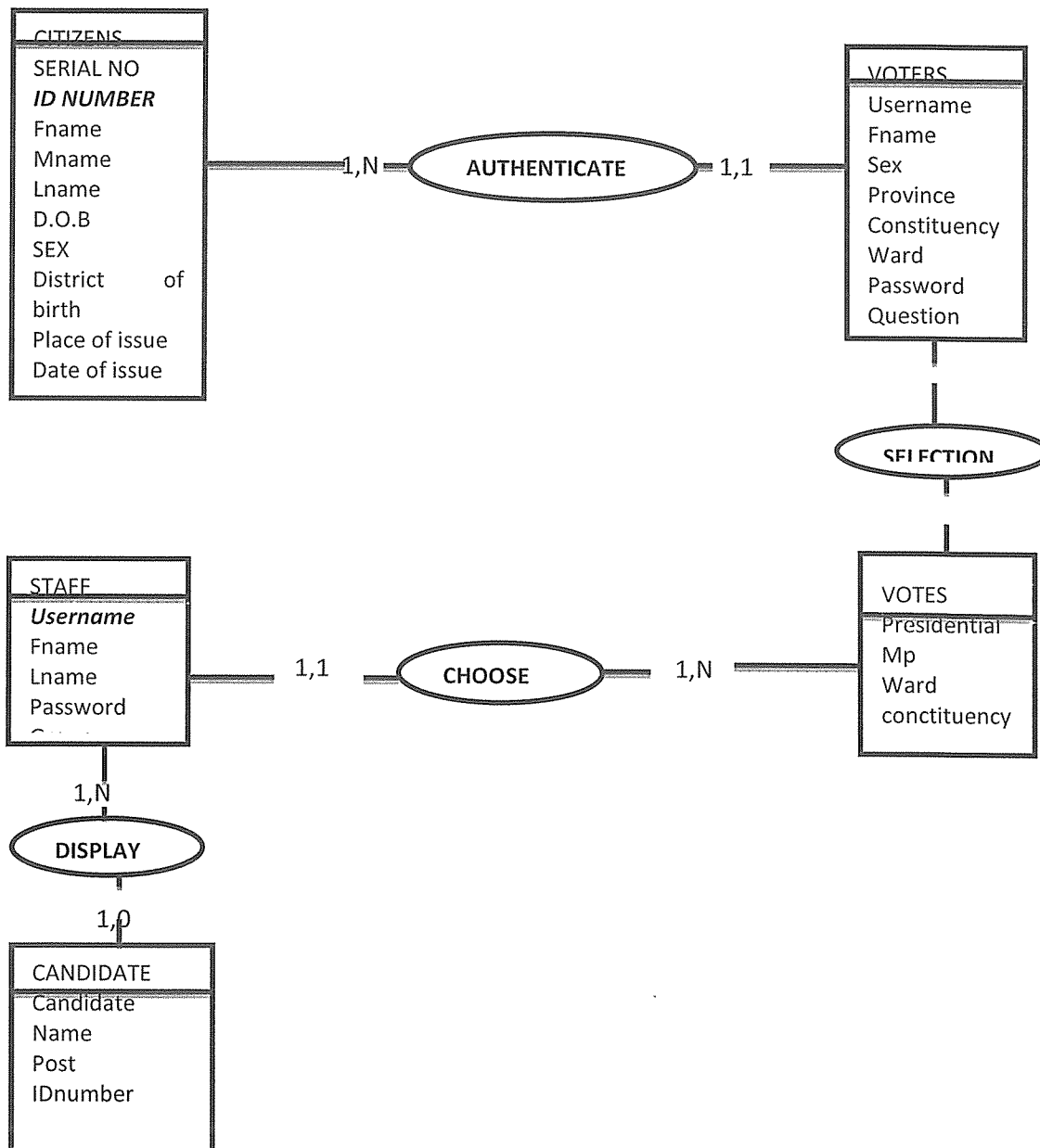


Figure 4.9.0 conceptual model

4.9.1 Logical Model

The logical model is concerned with type of relationship that exists between entities, in our case we have identified foreign keys to be included in our relationship, entities included are voter, candidates, manifesto, cast vote and results with votes sharing a foreign key with cast vote and candidates entities respectively as shown below:

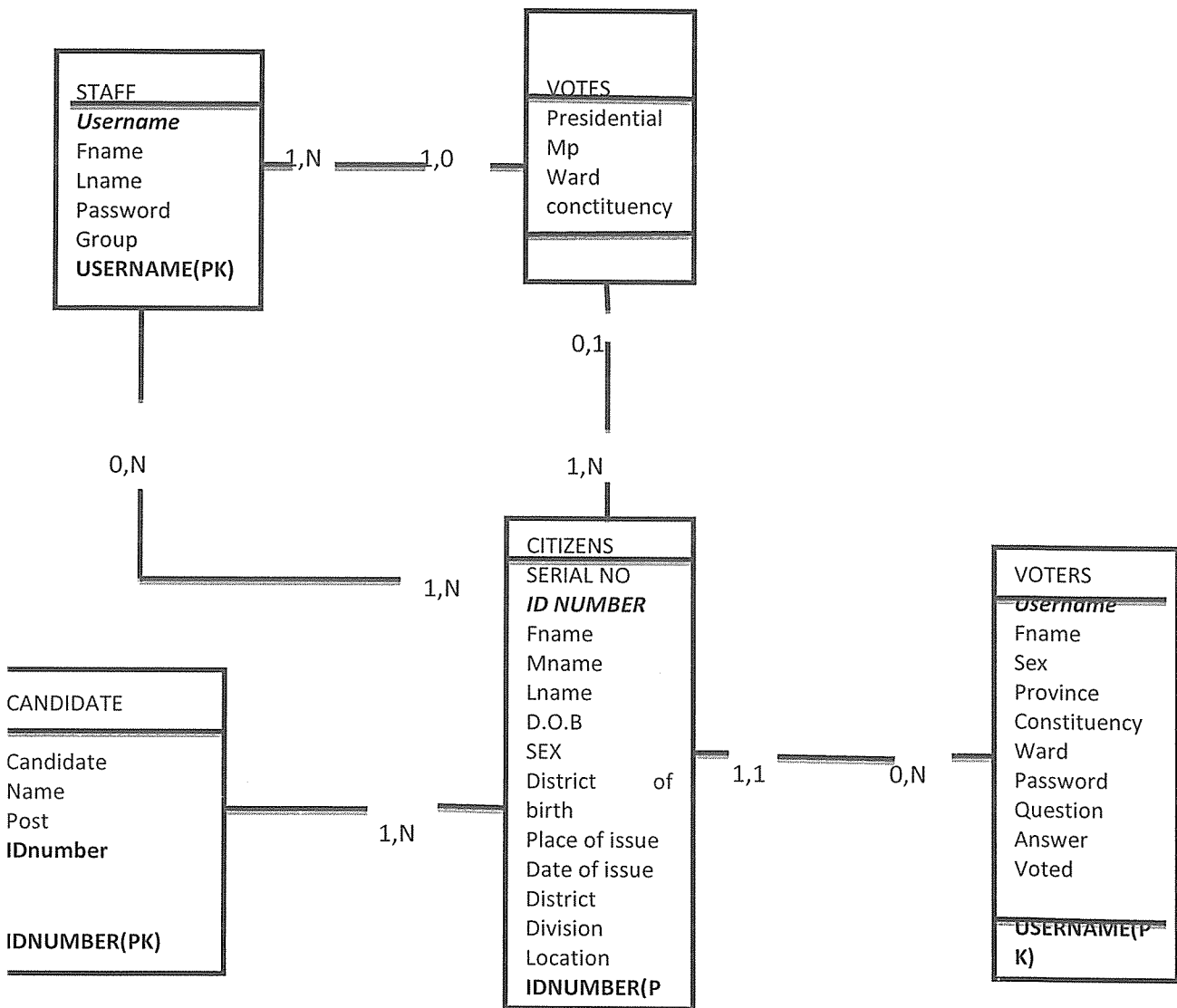


Figure 4.9.1 Logical model

4.9.2 Physical Model

The physical model concerns itself with how to physically implement, the database. In this diagram we are concerned with how data is stored in the database i.e. the physical naming of entities, the data type of each column or attribute and the length size of each record, in our case we will define it using the MYSQL syntax as shown below

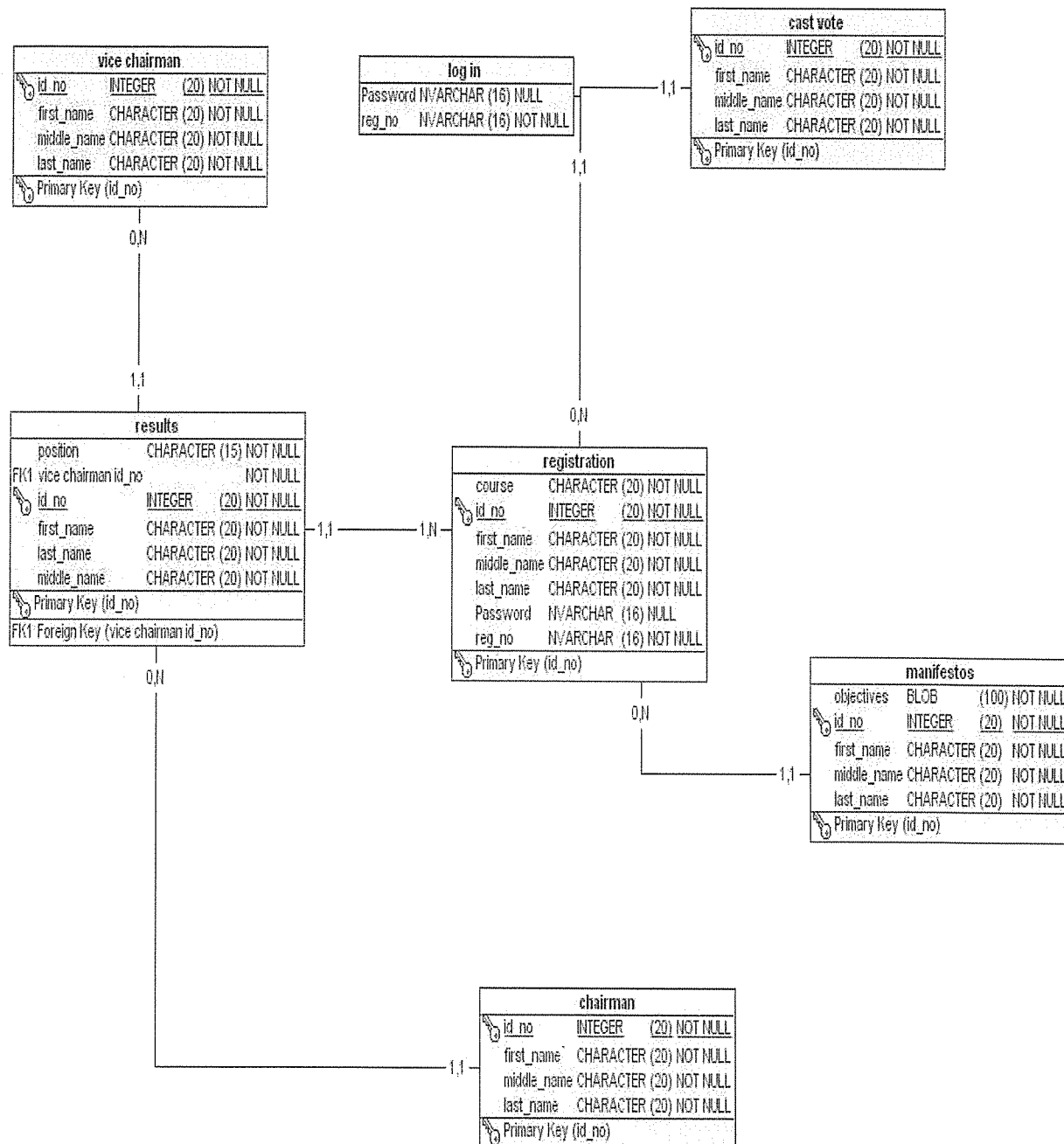


Figure 4.9.2 Physical model

CHAPTER FIVE

5.0 Implementation

This chapter is mostly concerned with handing over the process of the system to the users. Some of the activities includes file conversion, training and change over to the system.

The system is to be implemented using the pilot running technique by implementing a new system in portions. The work is then gradually transferred from the old system to the new system over a period of time. This ensures that any problems in the new system are resolved before the old system is withdrawn.

5.1 Programming languages used

The programming language used is PHP to develop the user interface, and coding purposes. This language was used due to the fact that it's a 4GL language which has the property of easy to learn and understand because they are user based. The language syntax is natural, near English language and the use of menus and prompts to guide a non-specialist to retrieve data with ease. To avoid the total dependency of the developer having to there, the language has a high pool of readily available programmers; this will greatly reduce the maintenance period and development time of the updates required.

5.2 Database used

The database language used in the application is MySQL. MySQL uses a structured query language that nears the English language, it is easy to understand and create a database using some few structured words.

Feature of MySQL include:

MySQL provides you with an easy Index Manager. You can manage multiple indexes, create indexes on multiple columns, change the order of columns in the index, etc.

MySQL powerful and easy to use Manage Permissions tool, you can give database, table & column level privileges to any user.

5.3 Code Extracts

```
if(isset($ok))
```

```
{
```

```
login();
```

```
}
```

The above code is used to recognize the variables that are present in the page at that point as a result of user interaction with the system. If the variable is present then the function enclosed in parenthesis is executed at that point.

```
$con=mysql_connect('localhost','root','');
```

```
$dbcon=mysql_select_db('iiec',$con);
```

```
if($dbcon)
```

```
{
```

```
if(!$_POST[username]||$_POST[password]||$_POST[question]||$_POST[answer])
```

```
{
```

```
die("YOU DID NOT FILL IN ALL THE DETAILS");
```

```
}
```

```
$selected=$_POST[question];
```

```
$sql="select * from voters where username='$_POST[username]' and  
password='$_POST[password]' and question='$selected' and answer='$_POST[answer]'";
```

```
$user=mysql_query($sql,$con);
```

```
}
```

```
if(mysql_num_rows($user)==1)
```

```
{
```

```
include("C:\wamp\www\IIEC\Web Pages\vote.html");
```

```
}
```

```
if(mysql_num_rows($user)==0)
```

```
{
```

```
die("LOGIN FAILURE CHECK ON THE DETAILS YOU ENTERED OR YOU DID NOT  
REGISTER FOR VOTING. THANK YOU... IIEC-K");
```

```
}
```

```
else
```

```
{
```

```

echo "LOGIN FAILURE CHECK ON THE DETAILS YOU ENTERED. THANK YOU... IIEC-
K";
}
mysql_close($con);
?>

```

The above function is used to authenticate the user via a database query if a match is found the current page is redirected to another page and if there is no match an error message is displayed

```

<?php
$dbcon=mysql_connect('localhost','root','');
$dbms=mysql_select_db('iiec',$dbcon);
if($dbms)
{
if(!$_POST[username]||!$_POST[firstname]||!$_POST[lastname]||!$_POST[province]||!$_POST[constituency]||!$_POST[ward]||!$_POST[password]||!$_POST[question]||!$_POST[answer]||!$_POST[optGender])
{
die ("YOU DID NOT FILL IN ALL THE DETAILS");
}
$username=$_POST[username];
$firstname=$_POST[firstname];
$lastname=$_POST[lastname];
$province=$_POST[province];
$constituency=$_POST[constituency];
$ward=$_POST[ward];
$password=$_POST[password];
$question=$_POST[question];
$answer=$_POST[answer];
$gender=$_POST[optGender];
$cnfrm=mysql_query("select * from citizens where ID_number='".$_POST[username] and
fname='".$_POST[firstname] and lname='".$_POST[lastname]'", $dbcon);
if(mysql_num_rows($cnfrm)==0)

```

```

{
die ("KINDLY YOU HAVE NOT REGISTRED AS A KENYAN CITIZEN");
}

$sql="insert                into                voters                values
('$username','$firstname','$lastname','$gender','$province','$constituency','$ward','$password
','$question','$answer','NO')";
if(mysql_query($sql,$dbcon))
{
include("C:\wamp\www\IIEC\Web Pages\viewinformation.php");
}
else
{
echo "REGISTRATION FAILED KINDLY VISIT ANY IIEC-K CENTER FOR ASSISTANCE.
THANK YOU.";
}
}
mysql_close($dbcon);
?>

```

This code is used to acquire data from the form by using inbuilt PHP functions and parse the same data into a table in the database.

```

<?php
$conn= mysql_connect("localhost","root","");
mysql_select_db("voting", $conn);
if (!$conn){
die("not connected");
}
?>

```

The above code is used to access the database server and selects the appropriate database within that server.

```

<?php
        $con=mysql_connect('localhost','root','');
        $db=mysql_select_db('iiec');

```

```

if($db)
{
$result=mysql_query("select * from votes");
echo "<table border='1'>

        <tr>
        <th>RAILA ODINGA</th>
        <th>MARTHA KARUA</th>
        <th>UHURU KENYATTA</th>
        <th>ALI MAKWERE</th>
        <th>ALI MWINIFAKI</th>
        <th>KIBWANA J</th>
        <th>HASSAN MOHAMED</th>
        <th>KARENGA STEPHEN</th>
        <th>MIKE ONYANGO</th>
        </tr>";

        $cand1=0;

```

The above code is used to access the table that has the votes and tallys the votes for the appropriate candidate.

```

<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1" />
<title>HIEC RESULTS</title>
<style type="text/css">
<!--
body {
    background-color: #CCCCCC;
}
.style1 {
    font-family: Verdana, Arial, Helvetica, sans-serif;
    font-size: 36px;
    color: #FFFFFF;
}
.style2 {

```

```

        font-family: Verdana, Arial, Helvetica, sans-serif;
        font-size: 12px;
    }
    .style3 {
        font-family: Verdana, Arial, Helvetica, sans-serif;
        font-size: 14px;
    }
    .style4 {font-family: Verdana, Arial, Helvetica, sans-serif}
-->
</style>
<script language="JavaScript">
<!--

```

The above code is cascading style sheets code that is used to style up the webpage.

It has page definitions that will be used to format the page accordingly.

5.4 Testing

5.4.0 Introduction

This plan addressed only those items and elements that are related to the Online voting system this were critical activity as they determined the correctness of the system and if the system meet its requirements. Both directly and indirectly affected elements were addressed. The main focus of the plan was to ensure that the new system provided the same level of information and detail as the current system while allowing for improvements and increases in data acquisition and level of details available.

5.4.1 Testing Strategy

This is the overall approach to testing, identifying what tests are to be applied and which techniques or tools are to be used.

Unit tester will be carried out on individual classes and units within the system to check whether the system can be able to carry out its basic functionality. Unit testing is used to validate that individual units of source code are working properly, A unit is the smallest testable part of an application which may consist of a class or a method within a class.

Amongst software testing tools, a unit tester is the one closest to the developer. In this context SimpleTest aims to be a complete PHP developer test solution and is called "Simple" because it should be easy to use and extend.

In this system(Online voting system) the researcher started by testing the logging class called login.php. The researcher started by creating a text script as shown below:

```
<?php
require_once('simpletest/unit_tester.php');
require_once('simpletest/reporter.php');
require_once('C:/Documents and Settings/Admin/My Documents/classes/log.php');

class TestOfLogging extends UnitTestCase {

    function testCreatingNewFile() {
        @unlink('/temp/test.log');
        $log = new Log('/temp/test.log');
        $this->assertFalse(file_exists('/temp/test.log'));
        $log->message('simpletest/reporter.php');
        $this->assertTrue(file_exists('/temp/test.log'));
    }
}

$test = &new TestOfLogging();
$test->run(new HtmlReporter());
?>
```

From the above the test case is run it start to search for any method that starts with string test and execute that method. The assertion with in the test methods trigger messages to test frame work which hence displays the results as shown below:

Results of the test; Fail: testcreatingnewfile->True assertion failed.1/1 test cases complete.1 pases and 1 fails.

5.4.2 Test Plan

A test plan was carried out by the researcher to check the basic functionality of the system by looking at all the items to be tested and at what level they will be tested.

TEST CASE	EXPECTED OUTPUT	ACTUAL OUTPUT	REMARKS
Does the application load well?	Welcome screen	Welcome screen	Ok
Does the application register voters?	Registration screen	Registration screen	Ok
Does the application authenticate voters?	Login Screen	Cast votes details	Ok
Does the application display the candidates to be selected?	Candidates list	Candidates categories	Ok
Does the application displays candidates manifestoes?	manifesto	manifestoes	Ok

Table 5.4.2 Test plan

CHAPTER SIX

6.0 Evaluation

Developing an Online Voting System for users is quite a challenge as the requirements change with time making it difficult to perfectly meet their needs. The time frame allocated for developing the end product is also drawback pushing down to poor system functionalities.

However the researcher was able to reduce the challenges to a significant level by using software development tools to incorporate changing requirements as they arise and working on overtime helped to overcome the time limit. The primary research project carried out has also helped the researcher to gain skills and experience in developing viable software solutions to solve problems in the real world.

6.1 Conclusion

Based on the findings of the study, it can be concluded that Elections around the Africa have been conducted using the manual system, however as the use of internet has been growing at a faster rate among the youths hence making making an Online voting system to be very convinient for the citizens as they choose their representatives.

The reseacher has seen internet as the best way to take democracy to the next level as the world changes to a global village hence achieving e-democracy. Currently extensive research is taking place all over the world in coming up with a secure, robust and well-designed election systems to preserve the bedrock of our democracy.

6.2 Recommendation

The system should be differentiated to run on different platforms such as on mobile phones and standalone that will be located in traditional voting stations, this will help in availability and accessibility of the System all over. The system should integrate Biometric mechanism in future to provide high level security, this will include using an automated finger print sensors to authenticate voters using finger print.

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APPENDICES

APPENDIX I: Glossary

- Class:** a class is an instance of an object that provides a template for describing objects in the real world
- Entity:** this refers to the individual tables within the database that consist of rows and columns, used for storing information in a database.
- Voting stations:** a place where voters go in order cast their votes.

APPENDIX II: Questionnaire for students

Questionnaire

Changanwe Constitution

The findings of this study will help in the development of the electronic voting system. Any information given will remain confidential and will only be used for the purpose of this study.

Your sincere cooperation will be highly appreciated.

Thank you.

Instructions:

Please fill the following details. Put only a single Tick (v) inside the box (□) of your choice as per the question.

1. Are you comfortable in browsing the internet?

Yes ☐

No ☐

2. Do you have a full access to the internet?

Yes ☐

Partial ☐

No ☐

3. Are the internet services reliable?

Yes ☐

No ☐

4. Are you comfortable with the current voting system?

Yes ☐

No ☐

If No, what problems do you experience?

.....

.....

5. Do you second an online voting system to be introduced?

Yes ☐

No ☐

If Yes, what benefits would be brought (personally) if a new online voting system was to being introduced?

.....

.....

6. Kindly suggest the features you think the system should have.

.....

.....

.....

.....

THANK YOU FOR YOUR TIME AND COOPERATION

Identification Number

Signature

.....

.....

APPENDIX III: Interview for Interim Independent Electoral Commission of Kenya

IIEC

Interviewee title: _____

Date of interview: _____

1. What problems are facing the Independent Electrol commission of Kenya in conducting elections in the Changanwe constituent, and what are the steps taken to counter this problem?

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2. How does the current system operate in terms of vote casting, voter authentication and vote tallying?

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3. What are the problems experienced with the current system?

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4. Are there any benefits of the current system?

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.....
.....
.....

5. Would you like a computerized (online voting) system introduced to implement the process.?

.....
.....

6. What kind of features would you suggest the system to have?

.....
.....
.....
.....
.....

signature

Thank you for your participation

APPENDIX IV: Interview for Agents
Voting Agents

Interviewee title: _____

Date of interview: _____

1. What are the problems in which you faced with the current voting system during the election?

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2. In your own opinion,what is the best ways to handle such problems?

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3. Would you like the next election to be computerised(online)?

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4. Why do you prefer that?

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5. What benefit will the new system bring to you as a candidate or the candidates who are contesting?

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6. Kindly suggest the features you think the system should have.

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signature

Thank you for your participation